The Sutton Academy

Knowledge Rich Curriculum Plan

Year 9 Core –Standard Form, Rounding and HCF/LCM.

Lesson objective	Intended Knowledge:	Tiered Vocabulary	Prior Knowledge:	Steps to Success	Feedback
To learn how to convert between standard form and ordinary numbers.	•Students will know that a number written in standard form is written as $a \times 10^n$, where $1 \leq a < 10$. •Students will know how to write large in the form $a \times 10^n$, where $1 \leq a < 10$. •Students will know how to write small numbers in the form $a \times 10^{-n}$, where $1 \leq a < 10$. •Students will know how to convert large numbers written in standard form back into ordinary numbers. •Students will know how to convert small number written in standard form back into ordinary numbers. •Students will know how to order numbers given in standard form by converting to them into ordinary numbers.	**Standard form -** a way of writing down very large or very small numbers easily, a number is written in standard form when it is written in the form a x 10^n where $1 \leq a < 10$	• Students need to know how to multiply and divide by powers of 10. • Students need to know how to calculate numbers with integer powers.	**Steps to Success - Writing numbers in standard form** **Step 1:** To write a number in standard form put the decimal point after the first significant figure. This will give you 'a' between 1 and 10. **Step 2:** Work out how many times you would have to multiply or divide that number by 10 to get the original number. **Step 3:** Write this after your number as x10^n where n is positive if the number needs multiplying by 10 and negative if we need to divide the number by 10. The value of n tells us how many times we need to multiply or divide by 10. **Steps to Success - Converting numbers out of standard form** To convert a number that is written in the form $a \times 10^n$ out of standard form, when n is positive multiply the 'a' by 10, *n* times. When *n* is negative divide the 'a' by 10, *n* times.	Combine this with the next lesson. Set 4 – Doing all of standard form was a bit too much for them. It took 4 lessons instead of 3.
To learn how to add and subtract numbers in standard form.	•Students will know how to adjust a number written in the form $a \times 10^n$ where $a > 10$ or $a \leq 0$ so that it is written in standard form. •Students will know that to add numbers written in standard form •Students will know that to subtract numbers written in standard form		• Students need to know how to convert ordinary numbers in and out of standard form.	**Adding and subtracting numbers written in standard form – Steps to Success** **Step 1:** Write the numbers as ordinary numbers **Step 2:** Add or subtract the numbers using column addition/subtraction **Step 3:** Write your answer in standard form if necessary **Step 4:** Check your answer is written in standard form, if not you will need to adjust your answer	
To learn how to multiply and divide numbers in standard form.	• Students will know that to multiply numbers written in standard form. • Students will know that the quickest way to multiply numbers written in the form $a \times 10^n \times b \times 10^n$, is to multiply *a* and *b* to get *ab*, then use index laws to combine the powers of 10 and then write the answer in standard form. • Students will know that to divide numbers written in standard form. • Students will know that the quickest way to divide numbers written in the form $a \times 10^n \div b \times 10^n$, is to divide *a* by *b* to get $\frac{a}{b}$, then use index laws to combine the powers of 10 and then write the answer in standard form. • Students will know to check their answer is in standard form and adjust it if necessary.		• Students need to know how to convert ordinary numbers in and out of standard form. • Students need to know how to use basic index laws.	**Dividing numbers written in standard form – Steps to Success** **Step 1:** Divide the 'a' for each number written in standard form **Step 2:** Divide the two 10^n parts, remember when dividing with powers it is the same as subtracting the powers **Step 3:** Put the two parts back together **Step 4:** If necessary, check your answer is written in standard form, if not you will need to adjust your answer **Multiplying numbers written in standard form – Steps to Success** **Step 1:** Multiply the 'a' for each number written in standard form	

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				Step 2: Multiply the two 10^n parts, remember when multiplying with powers it is the same as adding the powers **Step 3:** Put the two parts back together **Step 4:** If necessary, check your answer is written in standard form, if not you will need to adjust your answer	
To learn how to round to a given number of significant figures and estimate.	• Students will know how to round integers and decimals to one and two significant figures. • Students will know that to estimate a calculation you need to round to 1sf. • Students will know how to estimate the solution to a simple calculation. E.g. 483×52 • Students will know how to estimate calculations involving fractions when the denominator rounds to an integer. • Students will know how to estimate calculations involving fractions when the denominator rounds to 0.5. **Opportunity for challenge:** • Students will know how to estimate calculations from worded questions	**Significant –** important **One significant figure** –the first non-zero digit which has the most value **Estimate –** an approximate calculation of the value of something	• Students need to know how to round to the nearest 10, 100 and 1000. • Students need to know how to round to the nearest decimal place. • Students will need to know how to round to one significant figure.	**Steps to Success – Significant figures** **Step 1:** Determine the cut-off point. Draw a line after the desired number of significant figures. **Step 2:** Look at the first digit after the cut-off point. If it is below 5, then we keep the cut-off digit the same.If it is 5 or more, then we round up the cut-off digit. **Step 3** : Add any necessary 0's, delete any unnecessary 0's. **Steps to Success - Estimation** **Step 1:** Round the values in the question to 1 significant figure **Step 2:** Put the rounded numbers into the equation **Step 3:** Calculate the answer	Rounding to 1 significant figure is in the lesson and the starter?
To learn how to determine bounds and error intervals.	• Students will know how to find the upper and lowers bounds of numbers given to varying degrees of accuracy. • Students will know that the upper bound is rounded and they would actually everything up to but not including the upper bound. • Students will know how to use inequality notation to specify simple error intervals due to rounding. **Opportunity for challenge:** • Students will know how to use inequality notation to specify simple error intervals due to truncation.	**Upper bound** – an element greater than or equal to all the elements in a given set **Lower bound** – an element less than or equal to all the elements in a given set **Error interval** – an expression written using inequalities that shows the range of possible values that a number could have been before it was rounded or truncated. **Inequality –** a symbol which makes a non-equal comparison between two numbers or other mathematical expressions e.g. >, <, ≥ and ≤	• Students need to know how to round to varying degrees of accuracy. •	**Steps to Success – Finding Upper and Lower Bounds** **Step 1:** List the values with the same degree of accuracy that would come before and after the number that has been rounded with the number in the question in the middle. **Step 2:** Find the midpoint of the lowest value and the value that has been rounded – this is the lower bound. **Step 3:** Find the midpoint of the highest value and the value that has been rounded – this is the upper bound.	

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To learn how to use a calculator.	• Students will know that a calculator uses the order of operations. • Students will know how to input fractions into the calculator. • Students will know how to convert fractions to decimals using the standard to decimal button. • Students will know how to calculate numbers with powers. • Students will know how to calculate the roots of numbers. • Students will know how to use a calculator to solve more complex problems involving a mixture of fractions, powers and root. • Students will know how to write the values from the calculator display. • Students will know how to rounded their answers to a given degree of accuracy. • Students will know how to convert in and out of standard form using a calculator. • Students will know how to do calculations involving standard form.		• Students need to know how to round to a given degree of accuracy.		
To learn how to find the HCF and LCM of two numbers using Venn diagrams.	• Students will know how to find the highest common factor of two numbers by using the product of prime factors and a Venn diagram. • Students will know that to find the highest common factor from a Venn diagram they must find the product of the numbers contained within the overlap. • Students will know that if there is a single integer contained within the overlap of a Venn diagram then that number is the highest common factor of the two numbers. • Students will know that if there are no numbers contained within the overlap then the highest common factor of the two numbers is 1. • Students will know how to find the lowest common multiple of two numbers by using the product of prime factors and a Venn diagram. • Students will know that to find the lowest common multiple from a Venn diagram the must find the product of all the numbers contained within the whole Venn diagram. **Opportunity for challenge:** • Students will know how to find the HCF and LCM of three numbers using a Venn diagram.	**Venn diagram** - a diagram representing mathematical or logical sets pictorially as circles or closed curves within an enclosing rectangle (the universal set), common elements of the sets being represented by intersections of the circles.	• Students need to know how to find the product of prime factors. ***IF STUDENTS STRUGGLE THIS IS WHERE THE PRIOR KNOWLEDGE CONSOLIDATION SLIDE IS ESSENTIAL. YOU MUST NOT MOVE ON UNTIL STUDENTS ARE CONFIDENT WITH THIS***	**Steps for Success – Product of prime factors** **Step 1:** To construct a factor tree, think of 2 numbers which multiply together to make the integer in the question. **Step 2:** Draw two branches coming down from the integer, and at the end of the branches write the two factors that you chose. **Step 3:** If a factor is prime, then circle it. If a factor is not prime, then repeat the process until each number at the end of each branch is prime. **Step 4:** Write the prime factors as a product in index form. **Steps for Success – Finding the HCF and LCM from Venn diagrams.** **Step 1:** Find the product of prime factors for both numbers. **Step 2:** Now draw a Venn diagram where each circle represents each number. **Step 3:** Cross off a common factor from both lists and place the number in the overlap/intersection of the Venn diagram. Repeat this until there are no common factor left. **Step 4:** Place any remaining numbers from the lists into the circle that represents that number. **Step 5:** To find the **HCF**, we multiply the numbers in the intersection (these are the factors that are common between both numbers). To find the **LCM**	

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				we multiply all of the numbers in the Venn diagram together.	
To learn how to solve problems from lists using HCF and LCM.	• Students will know how to solve real-life LCM problems e.g. lights flashing/bus timetables Students will know how to solve real life LCM problems that involve interpreting the multiples. E.g. how many packets of burgers/hotdogs are needed.	**Multiple –** A multiple is a number in the given number's multiplication tables **Factor –** A factor is a number that divides into a given number without leaving a remainder **Common –** shared **Highest Common Factor** – the largest number that both or all of the numbers can be divided by **Lowest Common Multiple** – the smallest number that is in both numbers' times tables Key terminology to look for: Next time – means the multiples needed	• Students will know how to find the highest common factor (HCF) of two or more numbers by listing. • Students will know how to find the lowest common multiple (LCM) of two or more numbers by listing. *IF STUDENTS STRUGGLE THIS IS WHERE THE PRIOR KNOWLEDGE CONSOLIDATION SLIDE IS ESSENTIAL. YOU MUST NOT MOVE ON UNTIL STUDENTS ARE CONFIDENT WITH THIS*	**Steps to Success – Highest Common Factor (HCF) from lists** **Step 1:** List all the factors of both the numbers. **Step 2:** Identify the largest number they both have in common, this is the Highest common factor. **Steps to Success- Lowest Common Factor (LCM) from lists** **Step 1:** List the first 5-10 multiples of both numbers. **Step 2:** Identify the first multiple that is in both multiplication tables, this is the Lowest Common Multiple.	
Mini-Assessment 2					